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AUTHOR Wahl, Maureen; Besag, Frank
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ABSTRACT

This study compares and contrasts the following variables on the types of attributions (ability, effort, environment, and task) students make for their performance in algebra: attributions by gender and gender identification; attributions by level of math anxiety and self esteem; attributions by experience in competitive activities; and interactions between the variables. Interviews were conducted in addition to the administration of four tests assessing attributions, gender identification, math anxiety, and self esteem, using two ninth grade classes, one a high achievement class and the other an average class. The research was conducted in a parochial midwestern urban high school. Findings are reported for each variable studied. The summary indicates that students with placement in an accelerated algebra class, a low math anxiety score, a high self-esteem score, and a grade of A or B will attribute their mathematics success to their own ability and effort, and will attribute any failure externally to characteristics of the task. Previous research findings have indicated differences between boys and girls that were not corroborated in this study. It also appears that competition teaches students to rely on their own efforts and to attribute their performance to their efforts. (MNS)

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GENDER, ATTRIBUTIONS, AND MATH PERFORMANCE

Maureen Wahl

Frank Besag

University of Wisconsin-Milwaukee

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Objectives

This study compares and contrasts the following variables on the types of attributions (ability, effort, environment, and task) students make for their performance in algebra: Attributions by Gender and Gender Identification; Attributions by Level of Math Anxiety and Self Esteem; Attributions by Experience in Competitive Activities; and, Interactions between the variables.

Perspectives or Theoretical Framework

Attribution theory, in its broadest sense, is concerned with the attempt of ordinary people to make sense of the events they encounter. People are, from the perspective of attribution theory, intuitive psychologists who seek to identify the causes, social inferences, and predictions to which some particular action or outcome can be attributed (Ross, 1977).

Although research has demonstrated a relationship between gender and students' attributions about their academic performance, most studies have asked students to imagine or pretend that a situation occurred, and to indicate which attributions they would choose to explain the outcome of the situation. This study examines the attributions that students made about their actual final grades in their algebra classes. We then investigated the effect of gender, gender identification (masculine, feminine, androgynous, or undifferentiated), math anxiety, self-esteem, and experience in competitive activities.

Methods and/ Techniques

Standardized Tests:

Mathematics Attribution Scale (MAS) (Fennema, Wolleat, and Pedro, 1979) to measure attributions;

Ben Sex Role Inventory (BSRI) to measure gender identification;

Math Anxiety Rating Scale (MARS) to measure math anxiety;

Coopersmith Self-Esteem Inventory (SEI) to measure self esteem.

Interviews. In the one-to-one interviews we determined whether or not students are actively participating in competitive activities.

Procedures. All of the standardized instruments yield quantitative results so we performed analysis of variance, and step-wise multiple regression analysis using classification variables gender, gender identification, class placement (achievement level), mathematics class grades, and competition.

Data Source

All of the students attend a coeducational parochial high school in a metropolitan midwestern city. This city has been extensively studied because it is a demographic microcosm of the country as a whole (the median percentage of white collar vs. blue collar workers, black vs. white, etc.). Although the school is parochial, it is a good crosssection of the geographic area since the school recruits students from the entire city and suburban areas.

We selected two classes of ninth grade students, a high achievement math class and an average math class. Each student took all of the standardized tests and participated in the interviews.

Results and/or Conclusions

Gender as a Classification Variable. Males are more likely to attribute their success to ease of the task than are females. Females more often attribute their success to the learning environment. Males more often attribute failure in math performance to their own effort than do females. In general the males tend to make internal (to self) attributions for their failure and external (outside of self) attributions for success.

Gender Identification as a Classification Variable When the attribution scores were analyzed using gender identification as a classification variable, there was only one significant difference for attributions. Androgynous students more often attribute their success to their own effort than do the other groups.

Class Placement as a Classification Variable. The students in the accelerated algebra class attribute their success to their own ability more often than the students in the average algebra class. Conversely, the average algebra class attribute their failure to their own ability or inability more often than the students in the accelerated class. Further, the students in the average class more often attribute success to the characteristics of the task (and easy assignment or task) than do the students in the accelerated class. In general, the average algebra students make external attributions for success and internal attributions for failure.

Gender by Class Interaction. The average algebra females more often attribute their success to the task than do the accelerated females. Conversely, the accelerated females more often attribute success to their own ability than do the average algebra females. They also more often attribute their success to their own effort than do the average males. The average algebra males more often attribute their failure to their own effort than do either group of females.

Female accelerated students tend to attribute success to their ability and effort (internal). Male average students tend to make internal attributions for failure rather than success. Here males attribute failure to their lack of ability and effort while females attribute their success to their effort and/or ability.

Math Anxiety and Attributions. Students who score low on math anxiety, attribute success to their ability statistically significantly

more often than students who score high. Further, these students who score low on math anxiety more often attribute failure to characteristics of the task rather than their own ability or effort. This is consistent with the "self-serving bias" of attributing success to one's effort and/or ability and attributing failure to outside sources.

Self-Esteem and Attributions. As expected, students who score high on self-esteem also tend to attribute success to their own ability.

Grades and Attributions. The relationship between grades and attributions is that students with high algebra grades (A or B) attribute success to ability and/or the learning environment. Students with low algebra grades attribute failure to ability or felt lack of ability.

Competition as a Classification Variable. The only significant difference found among competitors and non-competitors is that male competitors more often attribute their failure to characteristics of the task than do male non-competitors.

Summary. In summary, placement in an accelerated algebra class, a low math anxiety score, a high self-esteem score and a grade of A or B predicts that students will attribute their math success to their own ability and effort. These students will attribute any failure externally (to characteristics of the task).

On the other hand, placement in an average algebra class, a high math anxiety score and a somewhat lower self-esteem score predicts that students will attribute success externally (the problems were easy because they were covered before) and failure internally (You have always had a difficult time in math classes).

Educational or Scientific Importance

Previous research has demonstrated that males more often attribute success and failure to the role of effort than females. This gender difference was not corroborated in this study. Rather, we found that both males and females who attribute their success and failure to their own efforts tend to increase their effort in order to increase their performance.

Another finding is that the students who participate in competitive activities tend to attribute their success and failure to their own effort. In this study, the androgynous students, who also tend to be competitors, attribute their success in math to effort significantly more often than any other group, male or female. It might be that competition teaches students to rely on their own effort and to attribute their performance to their own effort. If students will increase their effort in the regular classroom situation because they attribute their academic outcomes to their own effort it may be that teachers can find techniques to assist students to attribute success and failure to their own effort rather than to their ability or inability. In that way students can be encouraged to increase their performance by increasing their effort, rather than giving up due to a felt lack of ability.